

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Serial No. : 10/519,530 based on PCT/EP2003/006853 (WO 04/002886)  
371 (c) Date : April 29, 2005  
Applicant : Kolios, et al.  
Title : Integrated, Continuous Method for the Production of Molecular Single-Component Precursors having a Nitrogen Bridging Function

TC/AU : 1621  
Examiner : Elvis O. Price

Docket No. : 18744-0029  
Customer No. : 29052

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**APPEAL BRIEF**

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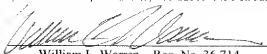
Sir:

Pursuant to 37 C.F.R. § 1.191 and M.P.E.P. § 1205, Applicants appeal the Examiner's final rejection of all pending claims in the referenced application. The fee of \$270.00 required under 37 C.F.R. § 41.20(b)(2) for a small entity is submitted herewith.

This Brief follows the Notice of Appeal filed May 12, 2009. It is not believed that any additional extensions of time or additional fees for net addition of claims or the Notice of Appeal are required. However, if additional extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required (including fees extensions of time, for net addition of claims, and for the

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I hereby certify that this correspondence is being electronically filed with the Commissioner for Patents, Mail Stop: Appeal Brief - Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on July 9, 2009.

  
William L. Warren - Reg. No. 36,714

Notice of Appeal) are hereby authorized to be charged to our Deposit Account No. 19-5029 (Ref. 18744-0029).

**I. Real Party in Interest**

The real party in interest in this appeal is Max-Planck-Gesellschaft zur Förderung der Wissenschaften e.V., a German corporation, having a principal place of business at Hofgartenstrasse 8, Munich, Germany 80539. This corporation is the assignee of the full, exclusive and entire right, title, and interest in the referenced application. The assignment of the patent application, Serial No. 10/519,530, was recorded on April 27, 2005, at the U.S. Patent and Trademark Office at Reel 016173, Frame 07805.

**II. Related Appeals and Interferences**

There are no appeals or interferences related to the appeal of the present application.

**III. Status of Claims**

Claims 1, 18, 20, and 22 have been cancelled. Claims 2-17, 19, 21, and 23-24 are pending and stand finally rejected as set forth in the Office Action mailed February 26, 2009 ("the Final Office Action"). The rejections of claims 2-17, 19, 21 and 23-24 are being appealed.

**IV. Status of Amendments**

No amendments have been filed subsequent to the Final Office Action.

**V. Summary of Claimed Subject Matter**

Applicants' claimed invention generally describes a method for the regeneration of a reactor and the use of said method for the improved performance of production processes for

products in which an ammonium salt is formed as a by-product in a reactor. The inventive methods include a cyclic process for preparing a product (claims 2-11, 17, 19, 21, 23, and 24) as well as a pseudocontinuous process for preparing a product (claims 12-16).

Independent Claim 2

Independent claim 2 describes a cyclic process for preparing a product in which an ammonium salt is produced as a by-product in a reactor. (page 4, lines 1-26). The process comprises retaining the ammonium salt in the form of a precipitate in the reactor and thereafter bringing the separated ammonium salt from the precipitate into the gas phase by heating the reactor to a temperature  $\geq 150^{\circ}\text{C}$ . (Id.).

*Dependent Claim 4*

Dependent claim 4 more narrowly describes the cyclic process of independent claim 2, specifying that the product being prepared comprises a single-component precursor of nonoxidic ceramics. (page 4, lines 28-38).

Independent Claim 12

Independent claim 12 describes a pseudocontinuous process for preparing a product in which an ammonium salt is produced as a by-product. (page 8, line 29 – page 9, line 1). The product is formed in a two-stage reaction carried out using two apparatuses per reaction stage. (Id.). One of the apparatuses is operated in the production mode to produce the product while the other apparatus is operated in the regeneration mode at a temperature  $\geq 150^{\circ}\text{C}$ . (Id.). The apparatuses can be switched over so that one of the apparatuses of each reaction stage is always in production mode while the other is in regeneration mode. (Id.).

## **VI. Grounds of Rejection to Be Reviewed On Appeal**

The following grounds of rejection are presented for review:

### Ground No. 1

Whether a *prima facie* case of anticipation has been established to support a rejection of claims 2-17, 19, 21 and 23-24 by European Patent No. 0 636 704 to Hey et al. ("Hey").

### Ground No. 2

Whether a *prima facie* case of obviousness has been established to support a rejection of claims 2-17, 19, 21 and 23-24 over Hey.

## **VII. Argument**

### Background

Preparation of the molecular precursors for nonoxidic inorganic ceramics often results in the formation of ammonium salts as by-products in the reactor. (page 2, lines 25-39). These salts precipitate and accumulate in the reactor volume, requiring periodic mechanical removal by opening the reactor. (page 4, lines 11-16). This removal process exposes the reactor volume to oxygen and moisture in the surrounding air, contaminating the reactor volume and impairing product quality. (page 2, lines 31-39).

The Applicants' claimed methods, however, solve these problems by providing a process for the simple removal of precipitated ammonium salts which have accumulated in the reactor without the need to open and mechanically remove the precipitated ammonium salts from the reactor. This allows for the process to be carried out on a continuous or pseudocontinuous basis, providing significant advantages over prior art methods.

B. Ground No. 1

The rejection of claims 2-17, 19, 21 and 23-24 as being anticipated by Hey is erroneous. A proper *prima facie* case of anticipation has not been properly established.

Under 35 U.S.C. §102, claims are “anticipated” if a single reference that is publicly available prior to the earliest priority date discloses each claimed element. Here, Applicants respectfully point out that the cited reference, Hey, does not explicitly or inherently teach each and every limitation set forth in claims 2-17, 19, 21 and 23-24.

1. Claims 2-3, 17 and 19

Hey does not teach the limitations of a cyclic process for preparing a product, formation of an ammonium salt as a by-product and retaining of that ammonium salt in the form of a precipitate in the reactor, or bringing the ammonium salt from the precipitate into the gas phase by heating the reactor to a temperature of  $\geq 150^{\circ}\text{C}$  as recited in claim 2 of the present application.

In particular, Hey fails to teach – either explicitly or inherently – that it is intended and necessary that the ammonium salts formed are first separated off, i.e., precipitated, before they are brought into the gas phase. On the contrary, as the Examiner has observed, “Hey discloses two situations. A) When the conduits are not heated, that ammonium chloride condenses on the apparatus. B) When the conduits are heated, that ammonium chloride does not condense on the apparatus.” (see Office Action dated March 24, 2008, page 2, paragraph 3). Applicants respectfully submit that such a disclosure is insufficient to anticipate Applicants’ claimed invention because it fails to disclose the claimed elements “arranged as in the claim.” (*Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989)). That is, Hey does not teach that the ammonium chloride by-product is both separated as a precipitate and then

subsequently removed by being brought into the gas phase during the process. In fact, Hey teaches that these two processes are mutually exclusive.

The Examiner fails to appreciate that although Hey teaches that ammonium salt by-products can precipitate and clog conduits, Hey also teaches that by heating the reactor “substantially no condensate deposits” during the reaction. (page 2, paragraphs [0008]-[0009]). Thus, Hey merely teaches how to prevent the formation of the ammonium salt precipitate, Hey does not teach that it is desirable to first retain the precipitate within the reactor and thereafter heat the reactor to bring the precipitate into the gas phase.

Despite these failures, the Examiner erroneously maintained the anticipation rejection by suggesting that “it’s reasonable to assume that the ammonium chloride is formed in-situ and inherently decomposes into its corresponding molecules.” (Office Action dated March 24, 2008, page 2, paragraph 3). A rejection based on inherency, however, requires that the elements of the claimed invention be a necessary consequence of the prior art. (See Continental Can Co. USA, Inc. v. Monsanto Co., 948 F.2d 1264 (Fed. Cir. 1991) (stating that “[i]nherency ... may not be established by probabilities or possibilities. The mere fact that a certain thing *may result* from a given set of circumstances is not sufficient.”) (Id. at 1268-69) (emphasis added)).

The Examiner, however, fails to provide any “basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.” (Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original); see also Ex parte Whalen, Appeal 2007-4423 (Bd. Pat. App. & Inter. 2008)).

Specifically, the Examiner has failed to show that the process taught by Hey necessarily provides for a cyclic process in which ammonium salt precipitates and then is subsequently removed into the gas phase by heating of the reactor. One skilled in the art would be just as likely to conclude from the teachings of Hey that by maintaining the process temperature sufficiently above the condensate temperature, the reaction bypasses or prevents the formation of the ammonium salt precipitate altogether, producing only its molecular components.

Based on the foregoing, Applicants respectfully submit that claims 2-3, 17 and 19 are not anticipated by the prior art.

2. Claims 4-11, 21, 23 and 24

Hey not only fails to disclose each and every element of dependent claims 4-7, 21 and 23 as set forth in independent claim 2 and described hereinabove, but also fails to disclose that the product of the cyclic process is a single-component precursor of nonoxidic ceramics. In fact, the Examiner has completely disregarded this limitation despite previously acknowledging that “the instant claims differ from the prior art by being directed to the removal of ammonium salts, which are formed as by-products in processes not explicitly shown in Hey.” (Office Action dated September 20, 2007, page 3). The Examiner has provided no reason or explanation for the basis of the rejection of these claims under 35 U.S.C. § 102(b).

An Examiner making a rejection of a claim under 35 U.S.C. § 102 has the initial burden of establishing anticipation. “[I]t is incumbent upon the Patent Office ... to set forth clearly why it regards a claim to be anticipated ....” (In re Mullin, 481 F.2d 1333, 1336 (C.C.P.A. 1973)). Thus, an Examiner may not merely assert that a particular reference anticipates a claim. The Examiner of the presently pending application, however, has never set forth where Hey discloses

that the “product is a single-component precursor of nonoxidic ceramics.” Thus, Applicants respectfully submit that the Examiner has not satisfied this initial burden of establishing anticipation.

Even if the Examiner had set forth some basis for Hey’s alleged anticipation of these claims, any such explanation would be insufficient to establish anticipation because Hey fails to each and every element of the claimed invention. As previously described, the disclosure of Hey is directed to the formation of silicon nitride films on various substrates. However, silicon nitride is not a single-component precursor of nonoxidic ceramics.

Those of ordinary skill in the art will appreciate that silicon nitride is a ceramic which is commonly used as an engineering material. Such materials are particularly desirable because they are “almost completely inert chemically.” (See e.g., Greenwood and Earnshaw, Chemistry of the Elements pp. 417 (Pergamon Press, NY) (1984) (noting that silicon nitride “is of considerable interest as an engineering material since it is almost completely inert chemically, and retains its strength, shape, and resistance to corrosion and wear even above 1000°”). A compound which is almost “completely chemically inert” is not a precursor compound capable of being subsequently polymerized and/or ceramicized in order to obtain a nonoxidic ceramic. Accordingly, the silicon nitride of Hey is not a single-component precursor of nonoxidic ceramics as required by Applicants’ claimed invention.

Based on the foregoing, Applicants respectfully submit that claims 4-11, 21, 23 and 24 are not anticipated by the prior art.



3. Claims 12-16

Hey also does not teach the limitations of a pseudocontinuous process for preparing a product where an ammonium salt is formed as a by-product, the process being carried out in a two-stage reaction with each reaction stage comprising two apparatuses, one of which is operated in the production mode and the other being operated in a regeneration mode at temperatures of  $\geq 150^{\circ}\text{C}$  as recited in claim 12 of the present application. The Examiner again has completely disregarded these limitations and provides no guidance as to the basis of the rejection of these claims under 35 U.S.C. 102(b).

As previously set forth hereinabove, the Examiner is under an obligation to clearly set forth why the Patent Office regards a claim to be anticipated. These claims initially were only the subject of an obviousness rejection; however, in the Office Action mailed September 5, 2008, and the Final Office Action mailed February 26, 2009, the Examiner baselessly expanded the rejection of these claims to also be anticipated by Hey without providing any reasoning or explanation for doing so, stating merely that the claims were “rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hey et al.”

Although the rejection of the claims was made in the alternative, Applicants respectfully submit that it is improper to make a rejection of claims in the alternative where the Examiner has failed to previously set forth the basis for one of the alternative rejections. Here, the Examiner has never set forth the basis for an anticipation rejection of claims 12-16. Thus, once again Applicants respectfully submit that the anticipation rejection of the claims is improper.

Even if the Examiner had sufficiently set forth the reasoning for regarding the claims as anticipated, Hey fails to teach each and every element of independent claim 12 and the dependent

claims thereon. Hey does not remotely teach or suggest that the ammonium salt is carried out in a two-stage reaction. Nor does Hey remotely teach or suggest that each reaction stage is composed of two apparatuses. Moreover, Hey does not teach that one of the apparatuses of each reaction stage is operated in the production mode while the other is being operated in the regeneration mode.

Based on the foregoing, Applicants respectfully submit that claims 12-16 are not anticipated by the prior art.

C. Ground No. 2

The rejection of Claims 2-17, 19, 21 and 23-24 as being obvious over Hey is erroneous, because a *prima facie* case of obviousness has not been properly established.

1. Claims 2-3, 17 and 19

The Examiner has failed to establish a *prima facie* case of obviousness for claims 2-3, 17 and 19. The Examiner has failed to consider the prior art in its entirety, impermissibly relying on hindsight reasoning to derive Applicants' claimed invention.

"It is impermissible ... to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." (*In re Wesslau*, 353 F.2d 238, 241 (C.C.P.A. 1965). Here, the Examiner erroneously has disregarded key teachings of the prior art which teach away from Applicants' claimed invention. Hey discloses problems with condensation of ammonium chloride in the prior art processes of silicon nitride deposition; however, the invention of Hey is directed to prevention of condensation during the process.

(page 2, paragraphs [0005]-[0006]). Hey effectively prevents the precipitation of ammonium salts *during the process* by heating the walls of the conduits and reactor.

Contrary to the Examiner's suggestion, one of ordinary skill in the art would not modify the process of Hey to require the precipitation and retention of the ammonium salt in the reactor and the subsequent heating of the reactor to bring the precipitate into the gas phase. Doing so would directly contradict the fundamental teachings of Hey and would render Hey unsuitable for its intended purpose by resulting in the contamination of the wafer.

Even if one skilled in the art were to modify the process of Hey, Applicants respectfully submit that the resulting process still would fail to read on Applicants claimed invention. There is no teaching or suggestion in Hey of the desirability of providing a cyclic two-step process which requires both the precipitation and retention of the ammonium salt in the reactor and a separate regeneration step for the heating and removal of the precipitate from the reactor as required in Applicants' claimed invention. In fact, as noted above, Hey actually teaches that the formation of the precipitate should be prevented entirely. Applicants respectfully submit that the Examiner can not merely disregard the significance of Applicants' cyclic process, which requires both a separate and distinct step of separating the precipitate during the synthesis phase before it is subsequently discharged from the reaction volume during the regeneration phase.

Based on the foregoing, Applicants respectfully submit that claims 2-3, 17 and 19 are non-obvious over the prior art.

## 2. Claims 4-11, 21, 23 and 24

Hey not only fails to render obvious the elements of independent claim 2, as set forth hereinabove, but also fails to render obvious the elements of Applicants' dependent claims 4-11,

21, 23 and 24. Specifically, it would not be obvious to apply the teachings of Hey to a process in which the product is a single-component precursor of nonoxidic ceramics.

As described hereinabove, Hey fails to disclose the specific products being formed in Applicants' claimed processes. The Examiner suggests that one skilled in the art would use the teachings of Hey in other processes in which ammonium salts are formed as a by-product; however, in making this argument the Examiner has provided no reference which teaches processes for making single-component precursors of nonoxidic ceramics and has provided no support for any general statements that such processes would have been obvious to those skilled in the art. In light of these failures, Applicants respectfully submit that the Examiner has not established a *prima facie* case of obviousness of Applicants' claimed invention.

Even if the Examiner had provided sufficient arguments and evidence to shift the burden to the Applicants, applying the teachings of Hey to the processes of the claimed invention would not lead one skilled in the art to both retain the ammonium salt in the form of a precipitate in the reactor and heat the process equipment in which ammonium salt precipitate has already formed in order to regenerate the reactor by bringing the ammonium salt into the gas phase. On the contrary, Hey clearly teaches that it is desirable to prevent the formation of the ammonium salt at all. This teaching directly contradicts Applicants' claimed invention. Accordingly, one skilled in the art would not use the teachings of Hey to obtain Applicants' claimed invention.

Based on the foregoing, Applicants respectfully submit that dependent claims 4-11, 21, 23 and 24 are non-obvious over the prior art.

3. Claims 12-16

The Examiner has failed to establish a *prima facie* case of obviousness for claims 12-16. The Examiner has failed to set forth the reasoning for making such a rejection and has failed to consider the claimed invention in its entirety.

As described hereinabove, independent claim 12 provides for a pseudocontinuous process for preparing a product in a two-stage reaction using two apparatuses per reaction stage, one of which is operated in production mode and the other operated in regeneration mode. The Examiner, however, has completely disregarded these limitations. In fact, the Examiner never even referenced these limitations during the course of prosecution. By failing to do so, the Examiner has failed to satisfy the initial burden placed on the Patent Office to establish a *prima facie* case of obviousness.

Even if the Examiner had set forth sufficient reasoning to support a *prima facie* case of obviousness for Hey over the presently claimed invention, Applicants respectfully submit that the resulting process still would fail to read on Applicants claimed invention. There is no teaching or suggestion in Hey of the desirability of providing a pseudocontinuous process. There is no teaching or suggestion in Hey of the desirability of carrying out a products preparation in a two-stage reaction. There is no teaching or suggestion in Hey of the desirability of carrying out each stage of the two-stage reaction using two apparatuses. There is no teaching or suggestion in Hey of the desirability of operating one of the apparatuses in each reaction stage in production mode while operating the other apparatus in each reaction stage in regeneration mode.

The Examiner can not simply disregard each of these elements of the claims, relying on the broad observation that “the essence of the claimed invention is that ammonium salts are

removed in the gaseous form.” By doing so the Examiner has merely distilled the “invention down to the ‘gist’ or ‘thrust’ of an invention” while disregarding the requirement that the subject matter of the claimed invention be analyzed as a whole. (See M.P.E.P. 2141.02(II)). Applicants respectfully submit that when the claimed invention is considered in its entirety, it clearly is not obvious over Hey.

Based on the foregoing, Applicants respectfully submit that claims 12-16 are non-obvious over the prior art.

The cited prior art, as a whole, fails to teach the claimed combination of elements defining Applicants’ claimed methods. No *prima facie* case of anticipation or obviousness has been established based on the references of record. The rejections, therefore, are improper and must be withdrawn.

#### **VIII. Claims Appendix**

The appendix containing a copy of the claims involved in the appeal can be found on page 16.

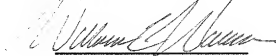
#### **IX. Evidence Appendix**

The appendix for evidence can be found on page 20. There is no evidence previously of record related to the appeal of the present application.

**X. Related Proceedings Appendix**

The appendix for related proceedings can be found at page 21. There are no appeals or interferences related to the appeal of the present application.

Respectfully Submitted,

A handwritten signature in dark ink, appearing to read 'William L. Warren', is written over a horizontal line.

By: William L. Warren  
Reg. No. 36,714

Date: July 9, 2009

SUTHERLAND ASBILL & BRENNAN LLP  
999 Peachtree Street, NE  
Atlanta, Georgia 30309-3996  
Telephone: (404) 853-8068  
Facsimile: (404) 853-8806

APPENDIX 1 – CLAIMS ON APPEAL

1. (Canceled)
2. (Previously Presented) A cyclic process for preparing a product, in which an ammonium salt is formed as a by-product in a reactor, comprising retaining the ammonium salt in the form of a precipitate in the reactor and thereafter bringing the ammonium salt from the precipitate into the gas phase by heating the reactor to a temperature of  $\geq 150^{\circ}\text{C}$ .
3. (Previously Presented) The process as claimed in claim 2, wherein the ammonium salt which has been brought into the gas phase is separated off.
4. (Previously presented) The process as claimed in claim 2, wherein the product is a single-component precursor of nonoxidic ceramics.
5. (Previously Presented) The process as claimed in claim 4, wherein the product is a compound which has the structural feature X-N-Y, where X and Y can each comprise, independently of one another, Si, P, Al, Ti, V, Zr, B, Ga or/and In.
6. (Previously presented) The process as claimed in claim 5, wherein the compound has the formula (I)  $\text{R}_x\text{Hal}_{3-x}\text{Si-NR}^1\text{-BR}_y\text{Hal}_{2-y}$ ,  
where the radicals Hal are each, independently of one another, Cl, Br or I,  
the radicals R are each, independently of one another, a hydrocarbon radical having from 1 to 20 carbon atoms or hydrogen,  
 $\text{R}^1$  is a hydrocarbon radical having from 1 to 20 carbon atoms or hydrogen,  
x is 0, 1 or 2 and  
y is 0 or 1.
7. (Previously Presented) The process as claimed in claim 4, wherein the synthesis of the product, a single-component precursor, is carried out in a two-step reaction process.



8. (Previously Presented) The process as claimed in claim 4, wherein the process comprises the steps
- (i) synthesizing the product, a single-component precursor of nonoxidic ceramics having a nitrogen bridging function, in a two-stage reaction and
  - (ii) regenerating the reactor by heating to temperatures of  $\geq 150^{\circ}\text{C}$ .
9. (Previously Presented) The process as claimed in claim 8, wherein the synthesis phase and the regeneration phase are carried out alternatively a plurality of times.
10. (Previously presented) The process as claimed in claim 8, wherein the switching over between the synthesis phase and the regeneration phase is controlled by the total pressure drop in the reaction steps.
11. (Previously presented) The process as claimed in claim 8, wherein the change between synthesis phase and regeneration phase is controlled by a temperature change.
12. (Previously presented) A pseudocontinuous process for preparing a product, in which an ammonium salt is formed as by-product and the preparation is carried out in a two-stage reaction, comprising using two apparatuses per reaction stage, of which one is operated in the production mode and the other is operated in the regeneration mode at temperatures of  $\geq 150^{\circ}\text{C}$ .
13. (Previously presented) The process as claimed in claim 12, wherein the product is isolated from the remaining components of the reaction mixture, in particular by crystallization, condensation and/or the use of a solvent.
14. (Previously presented) The process as claimed in claim 12, wherein unreacted starting materials are recycled.

15. (Previously presented) The process as claimed in claim 12, wherein  $\text{MeNH}_2$  and at least one of the compounds  $\text{SiCl}_4$ ,  $\text{BCl}_3$ ,  $\text{PCl}_3$ ,  $\text{PCl}_5$ ,  $\text{AlCl}_3$ ,  $\text{GaCl}_3$ ,  $\text{InCl}_3$ ,  $\text{TiCl}_4$ ,  $\text{VCl}_3$ ,  $\text{VCl}_4$ ,  $\text{ZrCl}_4$  or  $\text{TaCl}_5$  are used as starting materials for the first reaction step.

16. (Previously presented) The process as claimed in claim 12, wherein the intermediate product from the first reaction step and at least one of the compounds  $\text{SiCl}_4$ ,  $\text{BCl}_3$ ,  $\text{PCl}_3$ ,  $\text{PCl}_5$ ,  $\text{AlCl}_3$ ,  $\text{GaCl}_3$ ,  $\text{InCl}_3$ ,  $\text{TiCl}_4$ ,  $\text{VCl}_3$ ,  $\text{VCl}_4$ ,  $\text{ZrCl}_4$  or  $\text{TaCl}_5$  are used as starting materials for the second reaction step.

17. (Previously presented) The process as claimed in claim 2, wherein the product is isolated from the remaining components of the reaction mixture, in particular by crystallization, condensation and/or the use of a solvent.

18. (Canceled)

19. (Previously presented) The process as claimed in claim 2, wherein unreacted starting materials are recycled.

20. (Canceled)

21. (Previously Presented) The process as claimed in claim 7, wherein  $\text{MeNH}_2$  and at least one of the compounds  $\text{SiCl}_4$ ,  $\text{BCl}_3$ ,  $\text{PCl}_3$ ,  $\text{PCl}_5$ ,  $\text{AlCl}_3$ ,  $\text{GaCl}_3$ ,  $\text{InCl}_3$ ,  $\text{TiCl}_4$ ,  $\text{VCl}_3$ ,  $\text{VCl}_4$ ,  $\text{ZrCl}_4$  or  $\text{TaCl}_5$  are used as starting materials for the first reaction step.

22. (Canceled)

23. (Previously presented) The process as claimed in claim 7, wherein the intermediate product from the first reaction step and at least one of the compounds  $\text{SiCl}_4$ ,  $\text{BCl}_3$ ,  $\text{PCl}_3$ ,  $\text{PCl}_5$ ,  $\text{AlCl}_3$ ,  $\text{GaCl}_3$ ,  $\text{InCl}_3$ ,  $\text{TiCl}_4$ ,  $\text{VCl}_3$ ,  $\text{VCl}_4$ ,  $\text{ZrCl}_4$  or  $\text{TaCl}_5$  are used as starting materials for the second reaction step.

24. (Previously Presented) The process as claimed in Claim 8 wherein the synthesis phase and the regeneration phase are carried out cyclically in succession.

APPENDIX 2 – EVIDENCE

None.

APPENDIX 3 – RELATED PROCEEDINGS

None.